

Experience of Laparoscopic Tubal Surgery at the Department of Obstetrics and Gynecology, University of Kiel, From 1999 Through 2000

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ABSTRACT

Objective: We analyzed the results of laparoscopic tubal surgery performed at the Department of Obstetrics and Gynaecology, University of Kiel, between 1999 and 2000. A retrospective review of 236 tubal surgical procedures was conducted: (1) patients with ectopic pregnancies, unilateral or bilateral tubal occlusions or alterations and (2) medically indicated sterilizations and salpingectomies.

Methods: Two specialists and 10 gynecologists in residency training performed the following 236 procedures: 64 salpingotomies, 74 salpingectomies, 25 salpingostomies, 8 tubal end-to-end anastomoses, 24 fimbrioplasties, and 41 tubal sterilizations. In June 2001, questionnaires were sent to all 236 patients who underwent laparoscopic tubal surgery to evaluate subsequent pregnancies. From the 195 answers received, 155 patients wished to have children and of these 79 (51%) became pregnant. In 8 tubal reversals, 6 pregnancies occurred, resulting in a 75% success rate. In the group of sterilizations and salpingectomies, no pregnancies occurred.

Results: A pregnancy rate of 51% resulted after tubal reconstructive surgery. After tubal sterilization, no pregnancies were observed in the following 3 years.

Conclusion: Laparoscopic tubal surgery has surpassed laparotomic tubal surgery with comparable success rates. Laparoscopic tubal surgery is also a less traumatic procedure.

Key Words: Laparoscopic tubal surgery.

INTRODUCTION

Endoscopic tubal surgery dates back to the 1960s.¹⁻⁴ The aim of this study was to evaluate the relative impact of various surgical techniques on pregnancy outcome after tubal surgery. This technique was one of the first surgical procedures performed via laparoscopy in our department. In 1979, Mettler et al⁵ summarized for the first time the results of tubal laparoscopic surgery at the Department of Obstetrics and Gynecology, University of Kiel. In 2001, we published 2 papers on laparoscopic reversal of tubal sterilization and laparoscopic management of adnexal tumors.^{6,7} The present article shows the variety of endoscopic tubal reconstructive procedures, tubal sterilizations, and salpingo-oophorectomies performed at the department from 1999 through 2000.

METHODS

The types of tubal laparoscopic surgery performed in 236 cases included the following: salpingotomy in tubal pregnancy cases, salpingectomy for tubal resection indications, salpingostomy, tubal end-to-end anastomosis, fimbrioplasty, and tubal sterilizations. The techniques were adapted to the individual requirements of the patient. For the umbilical trocar, we used the 10-mm Optiview from Ethicon. The CO₂ insufflation was performed with 37°C heated gas up to an intraabdominal pressure of 14 mmHg. In addition to the 10-mm umbilical incision, laparoscopic skin incisions, lateral to epigastric arteries, were performed bilaterally for the introduction of 5-mm ports. In some indications a third 5-, 11-, or 15-mm port was introduced into the pubic hair area or slightly above. For the laparoscopic procedure, the patient was placed in a steep Trendelenburg position, legs apart, with the fixation of an intracervical adapter by vacuum to allow 3-dimensional movement of the uterus and possible tubal chromoperturbation. Shoulder holders were fixed to the operating table to prevent the patient from sliding off the table. All procedures were carried out with the patient under general anesthesia with the operating personnel positioned as follows: the surgeon on the left side of the patient, the theatre nurse and the assistant surgeon and camera holder opposite the surgeon, the anesthetist at the head of the patient and, on some occasions, a second assistant sur-

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geon next to the chief surgeon. All surgical procedures were performed with the utmost care with as little organ laceration or destruction as possible.

Figure 1 demonstrates the different surgical procedures performed. Salpingotomy (**Figure 1A**) was applied in 5 steps. After careful rinsing of the abdominal cavity, we injected 1 to 2 wells of 10 mL of a 1:100 diluted vasopressin solution for local ischemia production. An endocoagulation strip was drawn in the area above the ectopic pregnancy, and the incision was performed with microscissors. The pregnancy product was then extracted and the wound carefully rinsed with a saline solution which included flushing the tube. The wound edges were later adapted with 2 sutures (4–6x0 Polydioxanone material) by using the intracorporeal knotting technique.

Salpingectomy (**Figure 1B**) in ectopic pregnancy cases was usually carried out by bipolar coagulation and dissection or by applying the sling technique, placing the loop as proximal as possible to the uterine tubal junction. Coagulation or ligation of the tubal artery has to be avoided to prevent a reduction in the ovarian blood supply.

In postmenopausal patients, the tubectomy was combined with an oophorectomy. Salpingo-oophorectomies were evaluated together with tubectomies ($n = 7$).

Salpingostomy (**Figure 1C**) was applied in cases of peripheral tubal occlusion and was carried out in 4 steps. The vasopressin derivative solution (ornipressin [Glycilpressin, Ferring AG, Kiel, Germany]) was injected in at least 2 wells of 2 mL to 5 mL in a 1:100 dilution and the incision performed with microscissors. The fimbria were inverted and fixed to the peritoneum with 1 to 2 sutures.

Fimbrioplasty (**Figure 1D**) required only a careful widening of the peripherally stenosed fimbrial ends. The entry with atraumatic forceps allowed a smooth dilation of the stenosed fimbrial ends.

Tubal sterilization, the coagulation of the proximal part, (**Figure 1E**) was performed in 4 steps: endocoagulation at 120°C, separation with hook scissors, inspection of the coagulated and cut tubal ends, and the final situs with bilaterally coagulated and separated tubal ends.

Tubal end-to-end anastomosis (**Figure 2**) was carried out applying the 2-stitch technique. The first stitch adapted the mesosalpinx, and the second stitch, with 4–6x0 Polydioxanone material, united the tuba muscularis.⁶ In some cases, a third stitch was applied either to the muscularis or the mesosalpinx. In all cases, the wound was sealed with

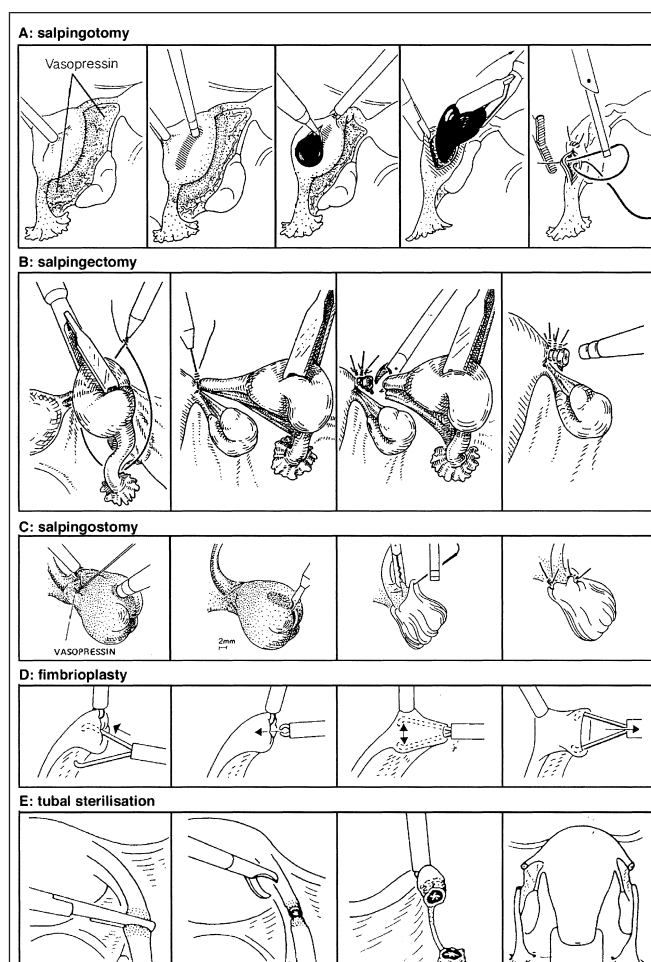
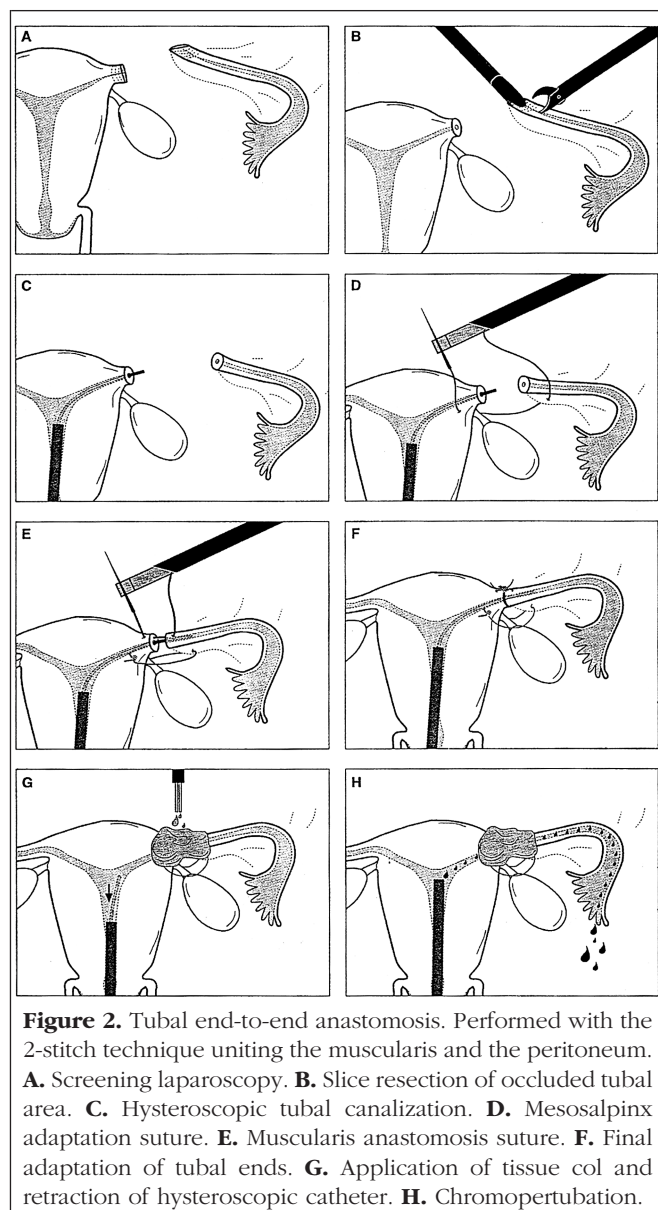


Figure 1. Laparoscopic tubal surgical techniques performed at the Department of Gynecology and Obstetrics, University of Kiel, 1999–2000. **A.** Salpingotomy with local application of the vasopressin derivative, coagulation strip, incision with the microscissors, extraction of pregnancy product and suture. **B.** Salpingectomy. The resection of the tube is carried out as close as possible to the uterine tubal junction. After placing a loop around the tube, the Roeder loop is closed, the tube dissected from the uterine tubal junction and the stump coagulated. **C.** Salpingostomy. In cases of peripheral tubal occlusion, inject the vasopressin derivative, incise with the microscissors, invert the fimbria, and suture. **D.** Fimbrioplasty. A blunt dilation of stenosed fimbria is performed with atraumatic forceps entering into the tubal ostium, opening the forceps and dilating the ostium. **E.** Tubal sterilization. With endocoagulation or bipolar coagulation, the tube is coagulated approximately 1 cm distal to the uterine tubal junction and dissected with scissors. This procedure is performed bilaterally.

Tissucol at the end of the procedure. Tissucol is a fibrin sealant applied to prevent adhesions.



The patients were asked to complete a postoperative questionnaire in reference to a consecutive pregnancy 6 months to 36 months after the primary surgery.

RESULTS

The 236 surgical procedures consisted of 64 (27%) salpingotomies, 74 (32%) salpingectomies, 25 (11%) salpingostomies, 8 (3%) tubal end-to-end anastomoses, 24 (10%) fimbrioplasties, and 41 (17%) tubal sterilizations. **Table 1** details the location of the surgical procedures on the left tube, the right tube, or bilaterally. The most frequent

Surgery	Right	Left	Bilateral	Total
Salpingotomy	39	22	3	64
Salpingectomy	35	20	19	74
Salpingostomy	10	8	7	25
End-to-end anastomosis	1	1	6	8
Fimbrioplasty	7	7	10	24
Tubal sterilization	4	3	34	41
Total	96	61	79	236

procedures performed were salpingectomies. In cases of peripheral tubal occlusions, an identical number of salpingostomies was performed on the right side, the left side, and bilaterally. End-to-end anastomoses, fimbrioplasties, and tubal sterilizations were mainly performed bilaterally. Due to the character of the disease, a salpingotomy was performed in only one tube.

The 195 patients who returned the completed questionnaire were divided into groups 1 and 2. Group 1 consisted of 101 patients with infertility problems who wished to have children. Fifty-one of these 101 patients became pregnant, resulting in a pregnancy rate of 51% (**Table 2**). None of the patients in group 2 became pregnant. It is important to mention that 6 of the 8 patients who underwent tubal end-to-end anastomosis became pregnant, resulting in a pregnancy rate of 75% in this small cohort. Forty-four deliveries resulted from the 51 pregnancies (7 of the pregnancies resulted in a miscarriage or ectopic pregnancy). The miscarriage rate including ectopic pregnancies was 15%.

DISCUSSION

Within the field of reproductive medicine, tubal surgery via operative laparoscopy has gained ground in spite of the long accepted laparotomy procedures for tubal surgery.^{8–14} Salpingotomy has universally been recognized as the only indicated treatment for patients with ectopic pregnancies.^{15,16} In only a few cases is laparotomy still performed for the treatment of ectopic pregnancy. Treatment of tubal pregnancy by laparoscopic salpingotomy was found to be a more economic procedure than systemic methotrexate administration.¹⁵

Table 2.

Follow-Up Period With Consecutive Pregnancy Rates 6 to 36 Months After Tubal Infertility Surgery (Group 1) and After Sterilization, Salpingectomy, or Contraceptive Pill Treatment (Group 2)

Surgical Procedure	Number	Pregnancies	Miscarriages	Ectopic Pregnancies
Group 1				
Salpingotomy	64	30	0	1
Salpingostomy	25	11	2	1
End-to-end anastomosis	8	6	1	0
Fimbrioplasty	16	10	1	1
Group 2				
Tubal sterilization	31	0	0	0
Contraceptive pill patients, salpingectomy, and OCP in cases of ectopic pregnancies	9	0	0	0
Salpingectomy	54	0	0	0

Already in 1979, in a wide survey of tubal procedures in pelvic reproductive surgery, Semm⁸ reported on the successful outcome of tubal surgery after salpingotomy via laparoscopy. This was later reported by many other authors.^{10–14}

Salpingectomy, in a few cases like adnexectomy, was primarily carried out in patients over the age of 45, as it is unanimously acknowledged that ovaries and tubes can be resected in patients beyond the reproductive age.^{7,17,18}

Laparoscopic salpingostomy for cases of peripheral tubal occlusions results in an equal number of consecutive pregnancies as microsurgery via laparotomy and has therefore been well accepted.^{9,19} While we prefer eversion of the fimbria, similar to the unfolding of a flower, with sutures,^{8,18} the French school and others prefer to avoid sutures with the rationale of adhesion formation.^{20,21}

Tubal sterilization by bipolar coagulation or endocoagulation,⁸ dissection, Filshie clip, and other endoscopic methods are well-accepted techniques,²² resulting in a nearly 100% success rate. To avoid consecutive pregnancies, dissection seems to be very important.

The role of laparoscopic salpingostomy in the treatment of hydrosalpinx²³ is well recognized. Peripheral tubal occlusions, once treated by laparotomic microsurgery, are now treated by laparoscopic surgery with good results. Tubal endoscopic surgery in cases of ectopic pregnancy and as an indication for sterilization is the choice of the moment.²⁴ Laparoscopic tubal surgery for the correction of proximal and peripheral tubal occlusions still remains an alternative technique for in-vitro fertilization and embryo

transfer. Reproductive medical treatment for infertility, such as in-vitro fertilization, embryo transfer, and intracytoplasmic sperm injection, has led to acceptable success rates; but comparable success rates can also be achieved with laparoscopic surgery in indicated cases.²⁵ After sterilization, laparoscopic tubal resection and anastomosis result in acceptable pregnancy rates of between 50% and 70%.^{6,26}

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